Supporting Information

Quantitative Real-Time Measurements of DNA Hybridization with Alkylated Non-Oxidized Silicon Nanowires in Electrolyte Solution

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Design and Assembly of PDMS Microfluidics Injection Chip

To deliver the analyte to individual sections of SiNWs we designed a microfluidics chip with six separate microchannels (Figure 1S). Such PDMS chip was fabricated using a standard photolithography: mixed PDMS (Dow Corning, Inc., Midland, MI) was applied over a pre-made photoresist molding on silicon wafer and incompletely cured at 80^{o}C for 30 minutes. The chip containing microchannels was cut out of the PDMS layer and 0.5mm diameter holes were punctured to serve as microchannel inlets and outlets. The fluidic chip and the device containing SiNWs were then brought into

contact, with the 100μm wide microchannels aligned over the individual nanowire sections. The assembled device was cured to completion overnight at 80°C.

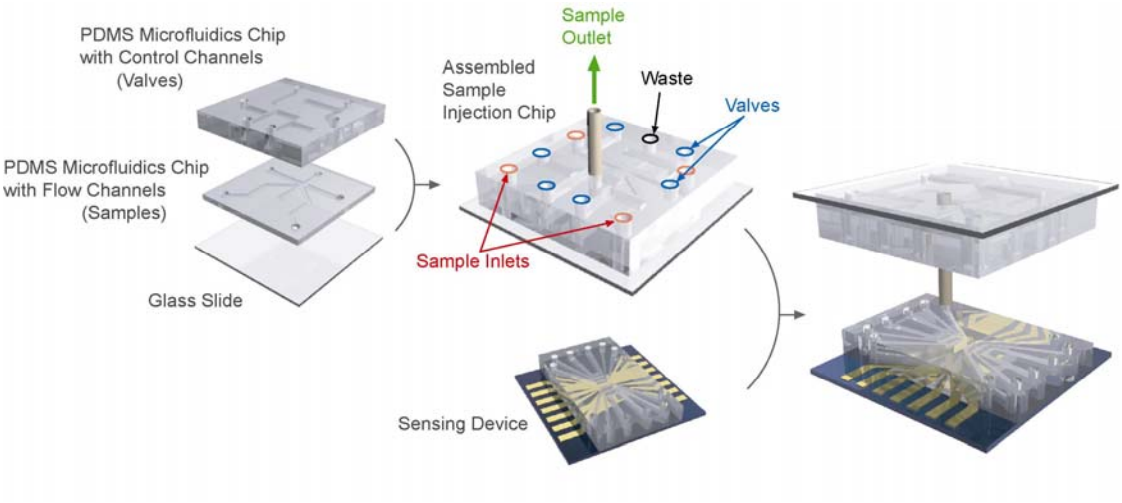

Figure 1S. Fabrication and assembly of the two-layer PDMS chip for solution injection (top) with the sensing device composed of SOI wafer and a single-layer PDMS chip with six separate microchannels (bottom).

To automate an injection/changing of analyte solutions, we also introduced a second PDMS chip which can sequentially inject four different solutions into one of six microchannels on silicon wafer. Such sample injection chip is composed of two layers, control layer and flow layer (Figure 1S). To fabricate the flow layer, mixed PDMS was spin coated on a photoresist mold at 2500 rpm for 50 sec and incompletely cured at 80°C for 30 minutes. Control layer was fabricated by applying mixed PDMS over a photoresist mold directly and incompletely curing at 80°C, followed by the puncturing of holes for inlets and outlets. The two layers were aligned together and the

inlets/outlets for the flow layer were created. After two hours at 80^{o}C, the two-layer PDMS chip was bonded to a glass slide utilizing an O_2 plasma treatment. By utilizing such sample injection chip, we were able to control the injection and solution changing processes without disturbing the measurement, while maintaining the sensing device in an electrically isolated chamber at all times. By introducing a waste outlet into the sample injection chip, we were able to remove any bubbles arising from switching between different solutions, which also helped in maintaining a stable baseline reading.

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